Solution Sets: Takeaways

Concepts

- An inconsistent system has two or more equations that no solution exists when the augmented matrix is in reduced echelon form.
  - Example of a inconsistent system:
- When the determinant is equal to zero, we say the matrix is singular or it contains no inverse.
  - Example of a singular matrix:
  - The formula for the determinant of a square matrix is:
  - If we substitute in the values, we get a determinant of zero:
- A nonhomogenous system is a system where the constants vector ( ) doesn't contain all zeros.
  - Example of a nonhomogenous system:
- A homogenous system is a system where the constants vector ( ) is equal to the zero vector.
  - Example of a homogenous system:
  - A homogenous system always contains the trivial solution: the zero vector.
- For a nonhomogenous system that contains the same number of rows and columns, there are 3 possible solutions:
  - No solution.
  - A single solution.
  - Infinitely many solutions.

- For rectangular (nonsquare, nonhomogenous) systems, there are two possible solutions:
    - No solution.
    - Infinitely many solutions.
- If is a linear system, then every vector which satisfies the system is said to be a solution vector of the linear system. The set of solution vectors of the system is called the solution space of the linear system.
- When the solution is a solution space (and not just a unique set of values), it's common to rewrite it into parametric vector form.
    - Example a vector in parametric vector form:

Resources

- [Consistent and Inconsistent equations]
- [Solution Spaces of Homogenous Linear Systems]